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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/845,231

04/30/2001

Arvind Halliyal

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3855

7590

04/23/2003

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EXAMINER

BARAN, MARY C

ART UNIT

PAPER NUMBER

2857

DATE MAILED: 04/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/845,231

Applicant(s)

HALLIYAL ET AL.

Examiner

Mary Kate B Baran

Art Unit

2857

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 28-30, 35 and 36 is/are pending in the application.
- 4a) Of the above claim(s) 8-27 and 31-34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 28-30, 35 and 36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 April 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election

1. Applicant's election with traverse of Group I, the species best illustrated by claims 1-7 and 28-30, in Paper No. 3 is acknowledged. Although Applicant has elected Group I with traverse, no argument has been supplied.

The requirement is still deemed proper and is therefore made FINAL.

Specification

2. The disclosure is objected to because of the following informalities: On page 2 line 6 "which impurities may be" should be – which may be –.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 28-30, 35 and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Moslehi (U.S. Patent No. 5,270,222).

Referring to claim 1, Moslehi teaches a system for controlling a thin film deposition process (see Moslehi, column 6 lines 50-60), comprising: one or more thin film deposition components operative to deposit a thin film on one or more portions of a

Art Unit: 2857

wafer (see Moslehi, column 9 lines 22-28); a thin film deposition component driving system for driving the one or more deposition components (see Moslehi, column 9 lines 28-42); a system for directing light on to the deposited thin film and collecting light reflected from the deposited thin film (see Moslehi, column 10 lines 13-16); a monitoring system adapted to detect structural irregularities associated with the deposited thin film by comparing reflected light data associated with the deposited thin film with a database comprising known thin film reflected light signatures (see Moslehi, column 20 lines 44-46 and column 20 line 65 – column 21 line 5); and a processor operatively coupled to the monitoring system and the thin film deposition component driving system (see Moslehi, column 6 lines 9-23), wherein the processor receives data from the monitoring system and communicates deposition parameter adjustments to the one or more deposition components according to the received data using feedback control (see Moslehi, column 6 lines 50-60).

Referring to claim 2, Moslehi teaches the monitoring system comprising a scatterometry system for processing the light reflected from the thin film (see Moslehi, column 10 lines 40-58).

Referring to claim 3, Moslehi teaches that structural irregularities associated with the thin film include large grains (see Moslehi, column 14 lines 58-67).

Referring to claim 4, Moslehi teaches that the processor determines the presence of an unacceptable thin film deposition condition for at least a portion of the wafer (see Moslehi, column 21 lines 2-5) according to the data received from the monitoring system (see Moslehi, column 20 lines 41-46).

Referring to claim 5, Moslehi teaches that the deposition parameter adjustments comprise at least one of thickness (see Moslehi, column 7 lines 44-49), uniformity (see Moslehi, column 7 lines 44-49), rate of deposition (see Moslehi, column 6 lines 53-60), pressure (see Moslehi, column 5 lines 56-62), flow rate of carrier gas (see Moslehi, column 5 lines 56-62) or temperature (see Moslehi, column 5 lines 56-62).

Referring to claim 28, Moslehi teaches a method for monitoring and controlling the deposition of a thin film (see Moslehi, column 6 lines 50-60), comprising: depositing a thin film on a wafer (see Moslehi, column 9 lines 22-28); directing a light onto the thin film (see Moslehi, column 10 lines 13-16); collecting a light reflected from the thin film (see Moslehi, column 11 lines 39-55); employing scatterometry means to analyze the reflected light to determine one or more properties of the thin film (see Moslehi, column 10 lines 40-50); and controlling a deposition component to deposit thin film on the wafer (see Moslehi, column 6 lines 50-60).

Art Unit: 2857

Referring to claim 29, Moslehi teaches that the properties include at least one of thickness (see Moslehi, column 7 lines 44-49) or uniformity (see Moslehi, column 7 lines 44-49).

Referring to claim 30, Moslehi teaches using a processor to control the at least one deposition component (see Moslehi, column 9 lines 22-28) based at least in part on data received from the scatterometry system (see Moslehi, column 10 lines 40-58).

Referring to claims 35 and 36, Moslehi teaches regulating a process for depositing a thin film (see Moslehi, column 9 lines 22-28), comprising, using one or more deposition components to deposit a thin film (see Moslehi, column 9 lines 22-28); determining the characteristics of the thin film deposition (see Moslehi, column 7 lines 37-49); and using a processor to coordinate control of the one or more deposition components to deposit the thin film (see Moslehi, column 6 lines 50-60).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2857

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moslehi (U.S. Patent No. 5,270,222) in view of Erhardt et al. (U.S. Patent No. 5,629,137) (hereinafter Erhardt).

Referring to claim 6, Moslehi teaches all the features of the claimed invention except that the processor is operatively coupled to a non-linear training system which facilitates the processor in determining deposition parameter adjustments to the one or more deposition components according to the received data.

Erhardt teaches that the processor is operatively coupled to a non-linear training system which facilitates the processor in determining deposition parameter adjustments to the one or more deposition components according to the received data (see Erhardt, column 4 lines 36-44).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Moslehi to include the teachings of Erhardt because adjusting the parameters using a non-linear training system would have allowed the skilled artisan to minimize error cost (see Erhardt, column 4 lines 36-39).

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moslehi (U.S. Patent No. 5,270,222) in view of Robinson et al. (U.S. Patent No. 5,629,137) (hereinafter Robinson).

Referring to claim 7, Moslehi teaches all the features of the claimed invention except that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks.

Robinson teaches that the processor partitions the mask into a plurality of grid blocks and makes a determination of deposition conditions at the one or more grid blocks (see Robinson, column 11 lines 27-50).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to modify Moslehi to include the teachings of Robinson because partitioning the mask and determining thickness at the grid blocks would have allowed the skilled artisan to enhance the physical robustness of reticle mask (see Robinson, column 40-44).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(a) Nakano teaches an apparatus and a method for checking a semiconductor.

(b) Duffy et al. teach a method and apparatus for determining the quality of a semiconductor surface.

(c) Opsal et al. teach a method and apparatus for evaluating surface and subsurface and subsurface features in a semiconductor.

(d) Lin teaches an apparatus and method for measuring optical properties of a coating layer.

(e) Aspnes et al. teach a thin film optical measurement system and method with calibrating ellipsometer.

Art Unit: 2857

(f) Carver teaches a method and apparatus for optically determining defects in a semiconductor material.

(g) Nemiroff teaches a method of fabricating integrated circuits incorporating steps to detect presence of gettering sites.

(h) Kleinknecht teaches the optical testing of a semiconductor.

(i) Kim teaches a method of analyzing a wafer in a semiconductor device fabrication process.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mary Kate B Baran whose telephone number is (703) 305-4474. The examiner can normally be reached on Monday - Friday from 8:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marc S Hoff can be reached on (703) 308-1677. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.


Application/Control Number: 09/845,231

Page 9

Art Unit: 2857

MKB

April 16, 2003


MARC S. HOFF
SUPERVISORY PATENT EXAMINER
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